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Date: May 7, 2007 /Jessica Sexton/
Jessica Sexton

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:			
Applicant(s):	Alexander Berger, *et al.*	Examiner:	Chelcie L. Daye
Serial No:	10/774,885	Art Unit:	2161
Filing Date:	February 9, 2004		

Title: OPTIMIZED DISTINCT COUNT QUERY SYSTEM AND METHOD

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Dear Sir:

Applicant submits this brief in connection with an appeal of the above-identified patent application. Payment of the $500.00 fee for filing this Appeal Brief is submitted herewith. In the event any additional fees may be due and/or are not covered by the fee submission, the Commissioner is authorized to charge such fees to Deposit Account No. 50-1063 [MSFTP606US].

I. Real Party in Interest (37 C.F.R. §41.37(c)(1)(i))

The real party in interest in the present appeal is Microsoft Corporation, the assignee of the present application.

II. Related Appeals and Interferences (37 C.F.R. §41.37(c)(1)(ii))

Appellants, appellants' legal representative, and/or the assignee of the present application are not aware of any appeals or interferences which may be related to, will directly affect, or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. Status of Claims (37 C.F.R. §41.37(c)(1)(iii))

Claims 1-25 and 27-31 are currently pending. The rejection of claims 1-25 and 27-31 is being appealed. Claim 26 has been cancelled.

IV. Status of Amendments (37 C.F.R. §41.37(c)(1)(iv))

No amendments were submitted after the Final Office Action dated December 5, 2006.

V. Summary of Claimed Subject Matter (37 C.F.R. §41.37(c)(1)(v))

A. Independent claim 1

Independent claim 1 recites a distinct count query system implemented on a machine comprising a query process component to retrieve a plurality of partitions from a database, a range component that determines the maximum and minimum values associated with each partition, and a group component that utilizes the maximum and minimum range values to determine independent partitions or partition groups, wherein independent partitions or partition groups are executed concurrently with other partitions. (*See e.g.* Figure 1 and corresponding text at pg. 6, l. 17-pg. 8, l. 18).

B. Independent claim 9

Independent claim 9 recites a distinct query system that partitions data to produce a highly scalable query processing system that is able to analyze data by spreading it across a plurality of servers or processors. The system comprises means for receiving partitions from

a database, a means for identifying independent partition groups, and a means for executing independent partitions in parallel with other partitions. (*See e.g.* Figure 6 and corresponding text at pg. 13, l. 19-pg. 14, l. 6).

C. Independent claim 14

Independent claim 14 recites a machine implemented method for executing a distinct count query comprising determining ranges associated with partition data, identifying independent partitions based on the partition ranges, and executing a distinct count query on a partition group concurrently with other partitions to be queried. (*See e.g.* Figure 1 and corresponding text at pg. 6, l. 17-pg. 8, l. 18).

D. Independent claim 22

Independent claim 22 recites a machine implemented method for executing a distinct count query on a database comprising pre-aggregating database data, determining a minimum and maximum range of a plurality of data partitions and identifying independent partition groups to be executed simultaneously with other queried partitions, the independent partition groups including one or more partitions with a non-overlapping range with respect to other queried partitions. (*See e.g.* Figure 1 and corresponding text at pg. 6, l. 17-pg. 9, l. 8).

VI. Grounds of Rejection to be Reviewed (37 C.F.R. §41.37(c)(1)(vi))

A. Whether claims 1-25 and 27-31 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Mittal *et al.* (US 2005/0138001) in view of Agrawal *et al.* (US 5,926,820) and further in view of Ballamkonda *et al.* (US 6,775,682).

VII. Argument (37 C.F.R. §41.37(c)(1)(vii))

A. Rejection of Claims 1-25 and 27-31 Under 35 U.S.C. §103(a)

Claims 1-25 and 27-31 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Mittal *et al.* (US 2005/0138001) in view of Agrawal *et al.* (US 5,926,820) and further in view of Ballamkonda *et al.* (US 6,775,682). Reversal of this rejection is requested for at least the

following reasons. Mittal *et al.*, Agrawal *et al.*, and Ballamkonda *et al.*, either alone or in combination, fail to teach or suggest all aspects of the subject claims.

> To reject claims in an application under §103, an examiner must establish a *prima facie* case of obviousness. A *prima facie* case of obviousness is established by a showing of three basic criteria. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second there must be a reasonable expectation of success. Finally, ***the prior art reference (or references when combined) must teach or suggest all the claim limitations***. *See* MPEP §706.02(j). The teaching or suggestion to make the claimed combination and the reasonable expectation of success must be found in the prior art and not based on the applicant's disclosure. *See In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (emphasis added).

Appellants' claimed subject matter relates to the optimization of a distinct count query on large quantities of data. Specifically, independent claim 1 (and similarly claim 22) recites *a range component that determines the maximum and minimum values associated with each partition and* ***a group component that utilizes the maximum and minimum range values to determine independent partitions or partition groups, wherein independent partitions or partition groups are executed concurrently with other partitions.*** Additionally, claims 9 and 14 recite similar aspects; namely claim 9 recites ***means for executing independent partitions in parallel with other partitions*** and claim 14 recites ***executing a distinct count query on a partition group concurrently with other partitions to be queried.*** Mittal *et al.*, Agrawal *et al.* and Ballamkonda *et al.*, whether taken alone or in combination, are silent regarding such aspects.

Mittal *et al.* relates to optimization for aggregate navigation for distinct count metrics and calculates a distinct count metric by performing a count operation on an aggregate table, but as the Examiner acknowledges, the primary reference does not teach or suggest a range component that determines the maximum and minimum values associated with each partition. Thus, to cure these deficiencies with respect to the primary document and the subject independent claim, the Examiner offers Agrawal *et al.* Agrawal *et al.* provides a method for performing maximum range *or* minimum range queries on a data cube and comprises the steps of partitioning the data cube into multi-level multi-dimensional blocks which are represented by a tree structure and

determining the index to the maximum or minimum value for each block, however, Agrawal *et al.* is completely silent regarding a range component that determines the maximum *and* minimum values *associated with each partition to determine independent partitions* as recited in the subject claims.

The Examiner further acknowledges that combination of Mittal *et al.* in view of Agrawal *et al.* is silent with respect to ***a group component that utilizes the maximum and minimum range values to determine independent partitions or partition groups, wherein independent partitions or partition groups are executed concurrently with other partitions***. Thus, to cure these deficiencies the Examiner provides Ballamkonda *et al.* Ballamkonda *et al.* relates to evaluation of rollups with distinct aggregate functions by using sequence of sorts and partitioning by measures. Distinct aggregate functions remove duplicate records and apply the aggregate functions to the resulting records. The rollup operator aggregates data across levels specified as the keys or columns of rollup operator. However Ballamkonda *et al.* does not teach or suggest ***a group component that utilizes the maximum and minimum range values to determine independent partitions or partition groups, wherein independent partitions or partition groups are executed concurrently with other partitions*** as recited in the subject claims.

On page 3 of the Final Office Action dated December 5, 2006, the Examiner erroneously asserts that Ballamkonda *et al.* discloses this aspect; however, the cited document provides parallel evaluation only of a rollup grouping with distinct aggregates. A fact table and associated dimensional tables are scanned, joined, sorted, and elimination of duplicate records is performed on the base table specified in the query so that less data is forwarded to the next stage. However, Ballamkonda *et al.* only provides for hash or range partitioning, and not determining ***independent partitions or partition groups*** based ***on maximum and minimum values associated with each partition, wherein independent partitions or partition groups are executed concurrently with other partitions*** as recited in the subject claims.

In view of at least the foregoing, it is readily apparent that Mittal *et al.*, Agrawal *et al.* and Ballamkonda *et al.*, when taken alone or in combination, fail to teach or suggest all aspects recited in claims 1 and 22, and similar aspects of claims 9 and 14 as described above. Accordingly, it is respectfully requested that the rejection of these independent claims (and the claims that depend there from) should be reversed.

B. Conclusion

For at least the above reasons, the claims currently under consideration are believed to be patentable over the cited references. Accordingly, it is respectfully requested that the rejection of claims 1-25 and 27-31 be reversed.

If any additional fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [MSFTP606US].

Respectfully submitted,

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VIII. Claims Appendix (37 C.F.R. §41.37(c)(1)(viii))

1. A distinct count query system implemented on a machine comprising:

a query process component to retrieve a plurality of partitions from a database;

a range component that determines the maximum and minimum values associated with each partition; and

a group component that utilizes the maximum and minimum range values to determine independent partitions or partition groups, wherein independent partitions or partition groups are executed concurrently with other partitions.

2. The system of claim 1, wherein the database is an OLAP database.

3. The system of claim 1, further comprising a buffer component to facilitate execution of the distinct count query on sections of the partitions.

4. The system of claim 1, wherein the partitions contain one or more numeric identifiers.

5. The system of claim 4, wherein the numeric identifiers are ordered in ascending order from smallest to largest value.

6. The system of claim 5, wherein the numeric identifier is a customer ID.

7. The system of claim 5, wherein the numeric identifier is a product ID.

8. The system of claim 1, wherein partitions with overlapping ranges are executed in parallel.

9. A distinct query system comprising:
a means for receiving partitions from a database;
a means for identifying independent partition groups; and
a means for executing independent partitions in parallel with other partitions.

10. The system of claim 9, wherein identifying independent partition groups comprises a means for determining a range of partition data.

11. The system of claim 10, wherein the independent partition groups have a non-overlapping range with respect to other partitions.

12. The system of claim 9, wherein partitions in the partition group contain ordered numeric identifiers.

13. The system of claim 9, wherein the database is a multidimensional database.

14. A machine implemented method for executing a distinct count query comprising:
determining ranges associated with partition data;
identifying independent partitions based on the partition ranges; and
executing a distinct count query on a partition group concurrently with other partitions to be queried.

15. The method of claim 14, wherein partition data includes numeric identifiers.

16. The method of claim 15, wherein the numeric identifiers are ordered in partitions.

17. The method of claim 16, wherein the identifiers are ordered in ascending order.

18. The method of claim 17, wherein the ranges are determined by retrieving the first and last values from each partition.

19. The method of claim 18, wherein an independent partition group includes one or more partitions that have non-overlapping ranges with respect to other partitions or partition groups to be queried.

20. The method of claim 19, wherein partitions with overlapping ranges are executed in parallel.

21. A tangible computer readable medium having stored thereon computer executable instructions for carrying out the method of claim 14.

22. A machine implemented method for executing a distinct count query on a database comprising:

pre-aggregating database data;

determining a minimum and maximum range of a plurality of data partitions; and

identifying independent partition groups to be executed simultaneously with other queried partitions, the independent partition groups including one or more partitions with a non-overlapping range with respect to other queried partitions.

23. The method of claim 22, wherein pre-aggregating database data comprises separating data into partitions.

24. The method of claim 23, wherein data is separated automatically based on heuristics associated with the database.

25. The method of claim 23, wherein pre-aggregating database data comprises ordering partition data.

26. (Cancelled)

27. The method of claim 22, wherein pre-aggregating database data comprises eliminating redundant data in each partition.

28. The method of claim 22, wherein the other queried partitions include overlapping ranges which are executed synchronously and in parallel.

29. The method of claim 22, further comprising executing the distinct count query on sections of partitions utilizing a buffer.

30. The method of claim 22, the database is an OLAP database.

31. A tangible computer readable medium having stored thereon computer executable instructions for carrying out the method of claim 22.

IX. Evidence Appendix (37 C.F.R. §41.37(c)(1)(ix))

None.

X. Related Proceedings Appendix (37 C.F.R. §41.37(c)(1)(x))

None.